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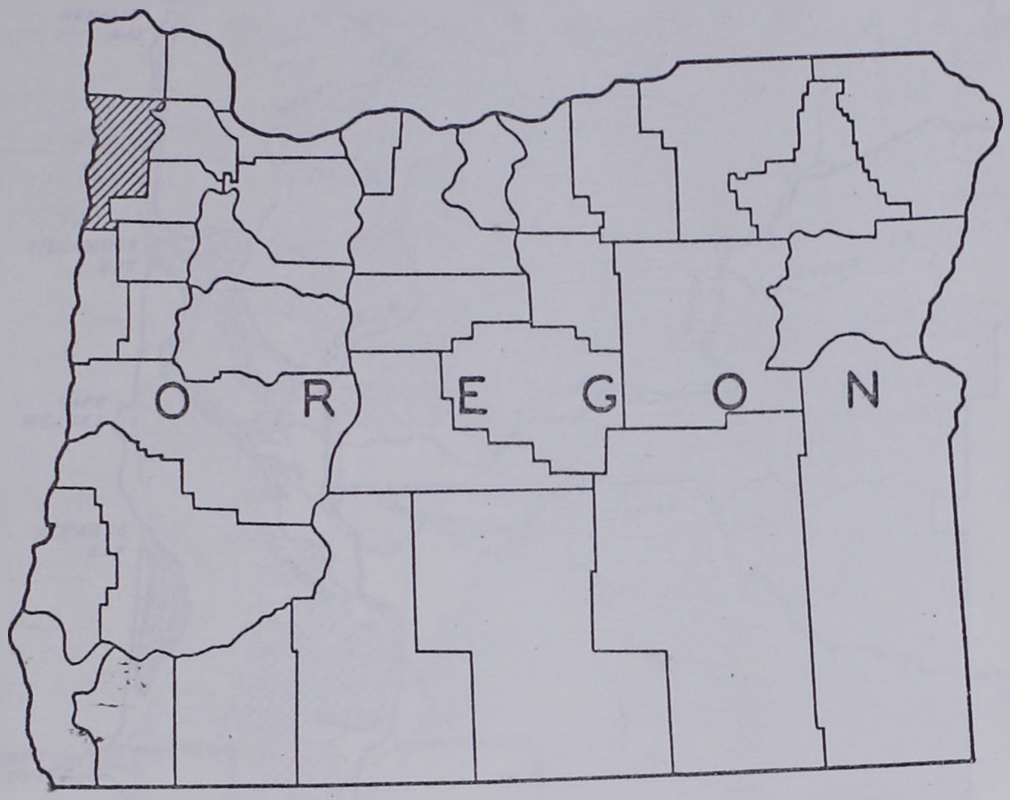
FOREST STATISTICS
FOR
TILLAMOOK COUNTY, OREGON

FROM THE FOREST SURVEY INVENTORY REVISED IN 1942

FOREST SURVEY REPORT NO. 90



U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
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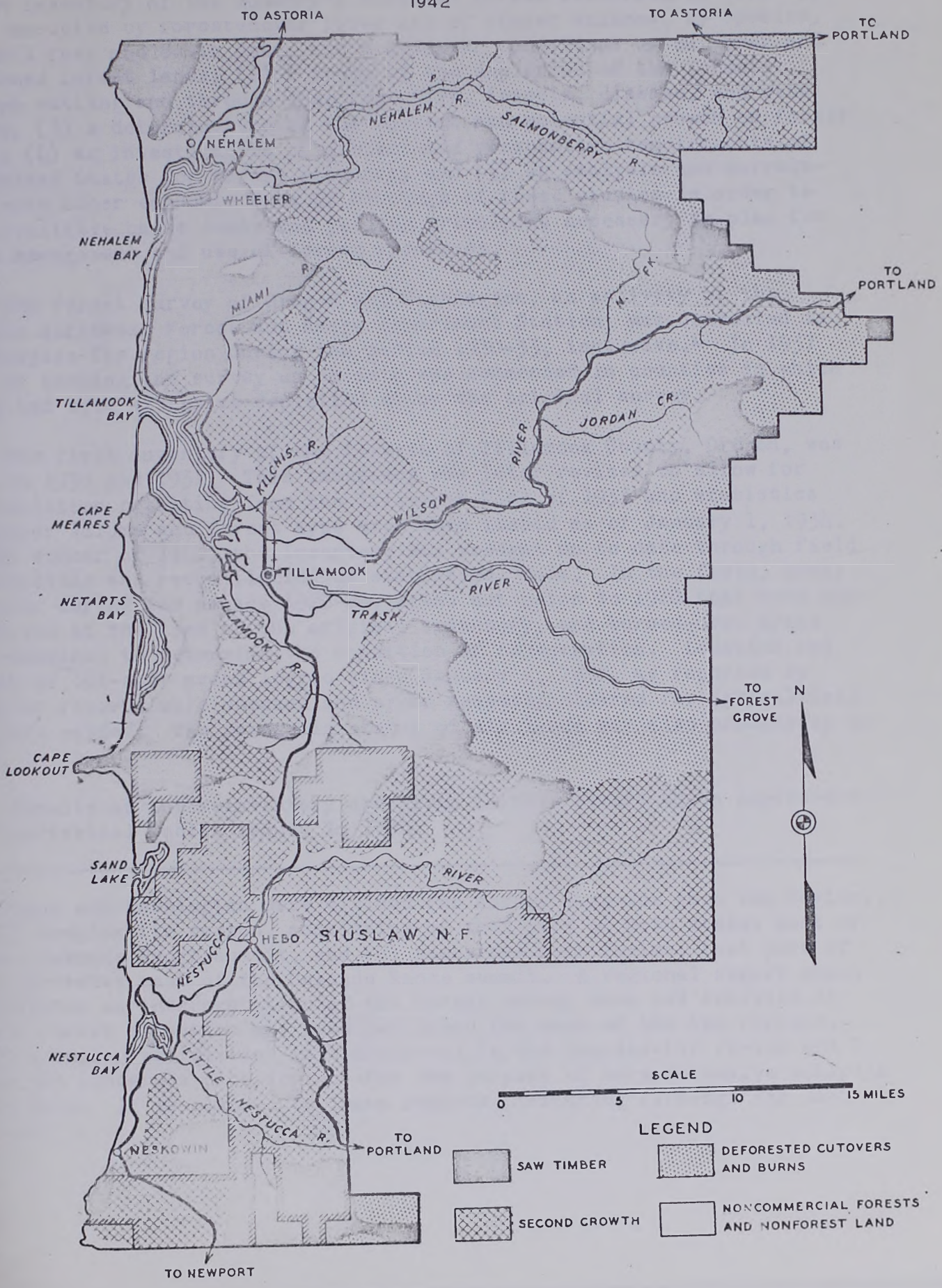
PORTLAND, OREGON

MARCH 15, 1943

FIGURE 1

OUTLINE MAP OF TILLAMOOK COUNTY, OREGON

1942



FOREWORD

The forest survey, a Nation-wide project, consists of a detailed investigation in five major parts of present and future forest resources: (1) An inventory of the country's existing forest resources in terms of areas occupied by forest-cover types and of timber volumes, by species, in board feet and cubic feet, and a study of conditions on cut-over and on burned forest lands; (2) a study of the depletion of the forests through cutting and through loss from fire, insects, disease, and other causes; (3) a determination of the current and potential growth on forest areas; (4) an investigation of present and prospective requirements of the United States for forest products; and (5) an analysis and correlation with other economic data of findings of these studies in order to make available basic facts and guiding principles necessary to plan for sound management and use of forest resources.

The forest survey of Oregon and Washington, an activity of the Pacific Northwest Forest and Range Experiment Station, was conducted in the Douglas-fir region during the period 1930-33, inclusive.* In 1937 work of keeping the survey up to date was commenced in counties in which there had been extensive depletion since the original survey.

The first inventory of the forests of Tillamook County, Oregon, was made in 1930 and 1931. This inventory was later revised to allow for the depletion resulting from the Tillamook Fire of 1933 and statistics on timber volume and forest type area were issued as of January 1, 1934. In the summer of 1942, the inventory was brought up to date through field examinations and recompilation of statistical data. In the field, areas cut over during the decade 1920-29, areas cut prior to 1920 that were non-restocked at the time of the original inventory, and burned-over areas were examined to determine the condition of regeneration. Location and extent of cut-over areas logged since January 1, 1930, as reported by cut-over records were checked and areas recently cleared for agricultural use were mapped. The ownership status of all lands was also brought up to date.

Results of the reinventory are given in this report which supersedes the statistical tables issued in 1934.

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* Oregon and Washington were divided for survey purposes into two regions, (1) Douglas-fir region, consisting of that part of both states west of the Cascade Range summit, and (2) ponderosa pine region, that part of both states east of the Cascade Range summit. A regional report which includes an interpretation of the forest survey data and analysis of the forest situation has been published for each of the two regions. Each region was divided into units--11 in the Douglas-fir region and 7 in the ponderosa pine region--for the purpose of more intensive analysis of data. It is planned to issue reports presenting findings for each unit.

FOREST STATISTICS FOR TILLAMOOK COUNTY, OREGON

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FOREST STATISTICS FOR TILLAMOOK COUNTY, OREGON

By George S. Meagher[1]

The present economic and social pattern of Tillamook County is built around three primary types of land use--the development of the limited, but highly productive, agricultural lands, the utilization of the timber from the extensive areas of forest land, and the use of recreational assets among which are fishing streams, sandy beaches, and some 50 miles of scenic coast line. A measure of the dependence on the first two uses is found in the U. S. Census figures for 1940. Twenty-seven percent of the 4,274 workers living in the county were engaged in agriculture or food processing, and 22 percent in logging or sawmill enterprises. The rest were mostly in service work of various types.

The present report is concerned with the forest resource, its original character, the extent of fires and cutting, and its present condition.

Physiography of the County

Tillamook County lies along the north Oregon Coast. Its east boundary, following roughly the crest of the Cascade Range, is some 25 miles west of Portland; its north boundary is about the same distance south of the mouth of the Columbia River (figure 1). The county is about 50 miles long and from 10 to 30 miles wide, with a land area of 723,380 acres. It slopes toward the ocean and is drained by seven coast streams--the Nehalem, Salmonberry, Miami, Kilchis, Wilson, Trask, and Nestucca Rivers.

Topography is typical of the coastal terrain; the fast-flowing streams have formed small level to rolling valleys near the coast, but their main drainage basins are decidedly rugged and well-drained, with high sharp ridges and deep narrow stream valleys. The Nestucca River basin near the south boundary of the county is somewhat less rugged in this respect than the watersheds further north. Elevations vary from sea level to slightly above 3,500 feet.

With prevailing winds coming from the ocean, the climate is generally temperate and humid. Extremes in temperature are rare, and the average frost-free period varies from about 140 days in the high mountains to over 200 days along portions of the coast. Annual precipitation ranges from 80 to 120 inches with four-fifths occurring during the fall and winter seasons (October through March). Snows are infrequent and remain on the ground only at high elevations. Winds from

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1/ Field work of the revised inventory was done by J. C. Wilkinson, J. Hughes, and George S. Meagher; data compilation was done by I. E. Fulkerson, W. H. Schwindel, and D. L. Masche.

the interior occasionally prevail for several days at a time; when they occur during the summer and fall seasons, forest fuels dry rapidly and a limited period of severe fire hazard may result.

The alluvial soils of the coastal valleys are deep and fertile and are devoted almost exclusively to the production of pasture and hay. Soils over the remainder of the area are lighter in color and texture, often stony, and usually well drained. Considerable bedrock is exposed on the sharp ridges and precipitous slopes where the soil mantle is thin; moderately deep soils prevail on the lower slopes.

The Original Forests

At the time of first white settlement in 1850, all of Tillamook County, with the exception of small areas of open meadow, sand dunes, and tidelands, was forested. Present conditions indicate that the original forest growth covered about 700 thousand acres including 640 thousand acres of conifer stands of saw-timber size, about 40 thousand acres of immature conifers, and possibly 10 thousand acres of hardwoods and non-commercial forests. The saw-timber stands were mostly 300 to 600 years old and were comprised of trees averaging from 3 to 6 feet in diameter and 200 to 250 feet in height; occasional trees were of greater size. Western hemlock and Sitka spruce were the characteristic trees of the coastal forests that extended 3 to 12 miles inland, and occupied about one-fifth of the forest land. Most of the remaining four-fifths supported mixed stands of Douglas-fir, western hemlock, and western red-cedar, in which Douglas-fir usually predominated. Upper-slope mixtures, with noble fir or Pacific silver fir in the majority, occupied smaller areas on the high ridges, usually at elevations in excess of 2,500 feet. Judged by present standards the original saw-timber volume of Tillamook County was probably in the neighborhood of 30 billion board feet.

Extent of Forest Fires, Insect Attacks, and Land Clearing and Logging Operations

Ninety years of settlement and occupancy have been accompanied by a small reduction in the total area of forest land and by major changes in the character of the forest stands. In the survey, 22 forest and 2 nonforest types were recognized and mapped in place; the resulting statistics on type acreage are given in detail in table 1.[2/] Forest lands now comprise about 656 thousand acres, indicating that some 44 thousand acres have been cleared and devoted to agricultural or other nonforest uses.

Agricultural lands (type 3), which cover about 60 thousand acres, are mostly found in three well-defined areas. The largest extends south and east from Tillamook Bay, a second adjoins Nehalem Bay, and the third

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2/ One-inch-to-the-mile county type maps and ¼-inch-to-the-mile lithographed state type maps have been prepared to show the location and extent of the forest types. For information address Director, Pacific Northwest Forest and Range Experiment Station, 423 U. S. Court House, Portland, Oregon.

Data corrected to July 1, 1942

Type No.	Type	Private 1/	State: Available	State: Reserved 2/	County	Federal: Revested land grant	Federal: Public domain 3/	Federal: National forest: Available	Federal: National forest: Reserved	Total
	Douglas-fir									
6	Large old growth	17,290	645	195	4,940	1,015	340	1,580		26,005
7	Small old growth	9,155	10	270	825			15		10,275
8	Large second growth	6,020	1,115	405	1,725	2,590	2,005	12,530		26,390
9	Small second growth	18,210	530	285	6,785	14,655	10,790	41,905		93,160
10	Seedlings and saplings	21,140	1,915	405	21,065	3,565	3,430	6,350		57,870
	Sitka spruce									
11	Large	11,245	35	1,375	2,195		165	1,140	120	16,275
12	Small	11,990	700		3,765		1,345	5,225	20	23,045
13	Seedlings and saplings	2,880	290		1,470		210	205		5,055
	Western hemlock									
14	Large	39,525	1,465	585	8,240		205	8,695	435	59,150
15	Small	10,265	485		7,345		4,075	2,945	135	25,250
16	Seedlings and saplings	8,695	1,005	280	13,735	25	1,535	260		25,535
17	Western redcedar, large	1,055		5	40					1,100
23	Fir-mountain hemlock, large	645			75					720
	Lodgepole pine									
25	Large	220	5		20		5	220		470
26	Small	940	15	280			40	55		1,330
	Hardwood									
31.5	Large	5,090	95	55	1,030	620	340	3,465		10,695
31	Small	4,055	165	20	1,310	90	100	2,925		8,665
	Nonrestocked cut-over									
35	Cut prior to 1920	125			45					170
35A	Cut from 1920-29, incl.	1,975	1,320		8,530	40		45		11,910
36	Recent cut-over, since 1930	32,615	105	865	4,760	170	25	355		38,895
37	Deforested burn	79,685	15,765	1,470	109,055	4,145	2,070	1,965		214,155
38	Noncommercial rocky area	140								140
	Total forest types	282,960	25,565	6,495	196,955	26,915	26,680	89,880	710	656,260
	Nonforest land									
3	In agricultural use	55,840	880	35	1,695	15	110	1,035		59,610
2	Other	4,450		1,170	600		455	830	5	7,510
	Total	343,250	26,545	7,700	199,250	26,930	27,245	91,745	715	723,380

1/ Includes 160 acres of Indian land.
2/ Includes 485 acres in municipal ownership.
3/ Includes 360 acres of lighthouse reserve.

follows the lower reaches of the Nestucca River. Most of the land suitable for cultivation or pasture has now been cleared, and no sizable extension of agricultural areas is anticipated. Towns, resort areas, sand dunes, and tideflats were classed as "other" nonforest land (type 2); altogether they account for about 7½ thousand acres.

Although the total area of forest land is only about 6 percent less than in 1850, the area of saw timber has dwindled from 640 thousand to only 140 thousand acres, a reduction of more than three-quarters. Forest fires have been the major factor, accounting for four-fifths of the total reduction.

The bulk of the Nestucca basin, as well as a sizable area north and east of Tillamook, burned over during the period 1850-1900. An additional 40 thousand acres in the north central part of the county was claimed by the Cedar Butte fire of 1918, and the Cochran fires of 1931 and 1932 accounted for smaller areas of saw timber in the Nehalem and Salmonberry drainages. The most severe loss occurred in 1933, when the great Tillamook Fire swept over 245 thousand acres in northwest Oregon, including 149 thousand acres of Tillamook County's finest remaining saw timber. In the Saddle Mountain fire of 1939, much of the Tillamook Fire area was reburned, and an additional 17 thousand acres of old-growth stands in the county was killed.

Large-scale logging operations were not started until 1911 when the completion of a railroad from Portland to Tillamook provided an outlet for logs and lumber. Roughly, 100 thousand acres of green saw timber has been cut over in the intervening years, and an additional 37 thousand acres in the Tillamook burn has been salvage-logged, preventing a complete loss of the fire-killed timber.

Though less spectacular than the fires, insect infestations have also caused serious losses in saw-timber stands. An outbreak of hemlock looper about 1890 defoliated and killed large numbers of trees in both Tillamook and Clatsop Counties. A second outbreak from 1918 to 1921 covered sizable areas along the Salmonberry River and Cook Creek drainages. As an aftermath of the 1933 fire, an epidemic of the Douglas-fir bark beetle also killed large numbers of green trees around the fringes of the burn.

The Present Forests

The present status of Tillamook County's forest land is presented graphically in figure 1 and statistically in the generalized type acreages of table 2. Roughly, one-fifth of the forest area contains conifer stands of saw-timber size, one-third supports immature conifers, and two-fifths have failed to restock following fires or cutting. The remainder is occupied by hardwoods or by noncommercial species.

Merchantable Saw Timber

Large old-growth Douglas-fir (type 6) which once covered the bulk of the county is now found on only 26 thousand acres. One block of about

Table 2.--Area, in acres, of generalized forest types, by ownership class
Data corrected to July 1, 1942

Type	Private 1/	State		County	Federal				Total
		Available	Reserved 2/		Revested land grant	Public domain 3/	National forest		
							Available	Reserved	
Conifer saw timber Types 6, 7, 8, 11, 14, 17, and 23	84,935	3,270	2,835	18,040	3,605	2,715	23,960	555	139,915
Conifer second growth Types 9, 12, and 15	8,840	635		3,565		310	350		13,700
On cut-over areas	31,625	1,080	285	14,330	14,655	15,900	49,725	155	127,755
On old burns	40,465	1,715	285	17,895	14,655	16,210	50,075	155	141,455
Total									
Conifer seedlings and saplings Types 10, 13, and 16	14,505	1,085	130	17,695		190	630		34,235
On cut-over areas	18,210	2,125	555	18,575	3,590	4,985	6,185		54,225
On old burns	32,715	3,210	685	36,270	3,590	5,175	6,815		88,460
Total									
Recent cut-over areas Type 36	32,615	105	865	4,760	170	25	355		38,895
Nonrestocked cut-over and burned areas Types 35, 35A, and 37	81,785	17,085	1,470	117,630	4,185	2,070	2,010		226,235
Hardwoods Types 31 and 31.5	9,145	260	75	2,340	710	440	6,390		19,360
Noncommercial areas Types 25, 26, and 38	1,300	20	280	20		45	275		1,940
Total forest types	282,960	25,665	6,495	196,955	26,915	25,880	89,880	710	556,260
Nonforest land Types 2 and 3	60,290	880	1,205	2,295	15	565	1,865	5	67,120
Total	343,250	26,545	7,700	199,250	26,930	27,245	91,745	715	723,380

1/ Includes 160 acres of Indian land.
2/ Includes 485 acres in municipal ownership.
3/ Includes 360 acres of lighthouse reserve.

6,000 acres remains on the high ridge west of Saddle Mountain, and another of about the same size occurs at the head of Cronin Creek along the north boundary of the county. The remainder of the type is found on many scattered tracts of less than 1,000 acres.

Small old-growth Douglas-fir (type 7) is found along the main divide between the Salmonberry and Wilson Rivers, where it occupies one almost continuous block of about 10 thousand acres.

Stands of large second-growth Douglas-fir (type 8) are largely confined to the Nestucca River watershed; these vary from 50 to 80 years in age and originated following early fires. One tract of about 2,000 acres is found in the northwest part of the county in the vicinity of Foley Creek. Trees in this stand are older and larger and part of the tract is now being logged. Altogether large second-growth Douglas-fir covers 26 thousand acres.

The spruce-hemlock forests of the coast have been less subject to severe fires than the Douglas-fir types further inland. As a result, they now comprise over half of the remaining saw-timber area. Saw-timber stands with spruce in the majority (type 11) occupy about 16 thousand acres. The largest body of this type, aggregating 7 thousand acres, follows the coast from Cape Lookout north to Cape Meares. A portion of this block is currently being selectively logged for aircraft grade spruce. Saw-timber stands predominately hemlock (type 14) are widely distributed throughout the coastal zone and also occupy smaller areas near the upper fringes of the Douglas-fir types. They cover a total of about 59,000 acres. The largest block extends from Tillamook Bay north to Nehalem Bay in a strip 3 to 4 miles wide.

Saw-timber stands of western redcedar (type 17) and noble fir (type 23) together cover only 1,800 acres. They are found in small scattered tracts, mostly less than 100 acres in area.

The Douglas-fir in the old-growth stands is generally fine grained and of good quality, producing a high percentage of peeler-grade logs; Douglas-fir of the second-growth stands is usually coarse grained and rough, but trees are uniformly sound and thrifty. The quality of the spruce and hemlock saw timber is more variable. Spruce trees over 40 inches in diameter will usually produce a high percentage of clears and veneer, but the smaller trees are generally rough and limby. Hemlocks are also apt to be rough, and defect in large trees is frequently high.

Most of the remaining tracts of saw timber are accessible and can be reached by extensions of existing logging roads.

Ownership of the conifer saw-timber area is: 61 percent private, 22 percent federal, 13 percent county, and 4 percent state. Only 3,390 acres of saw timber, mostly in state parks, is reserved from cutting.

Immature Conifers

Except for the large areas burned in the fires of 1933 or 1939, most burns and cut-overs were found to be restocked; immature conifer stands

Table 3.--Area, in acres, of certain immature forest types, by age class and degree of stocking
Data corrected to July 1, 1942

Age class (years)	Degree of stocking	Type number and name: 10 Douglas-fir seedlings and saplings	13 Sitka spruce seedlings and saplings	16 Western hemlock seedlings and saplings	9 Douglas-fir small second growth	12 Sitka spruce small second growth	15 Western hemlock small second growth	Total
10	Good	5,585		7,870				13,455
	Medium	17,725	1,695	3,360				22,780
	Poor	26,750	1,425	12,065		20		40,260
	Total	50,060	3,120	23,295		20		76,495
20	Good	190		115	225		45	575
	Medium	6,750	985	1,900	5,935	365	1,770	17,705
	Poor	715	210	170	875		155	2,125
	Total	7,655	1,195	2,185	7,035	365	1,970	20,405
30	Good	55	110		1,885	1,180	710	3,940
	Medium	100	480	55	12,740	4,315	3,995	21,685
	Poor				490	105	565	1,160
	Total	155	590	55	15,115	5,600	5,270	26,785
40	Good				10,715	140	2,325	13,180
	Medium		150		18,940	6,940	2,205	28,235
	Poor				1,490	30	1,190	2,710
	Total		150		31,145	7,110	5,720	44,125
50	Good				17,280	495	3,570	21,345
	Medium				22,135	515	2,705	25,355
	Poor				175		1,310	1,485
	Total				39,590	1,010	7,585	48,185
60	Good				115			115
	Medium				20		630	650
	Poor						115	115
	Total				135		745	880
70	Good					1,555	360	1,915
	Medium					630	1,055	1,685
	Poor							
	Total					2,185	1,415	3,600
80	Good					135		135
	Medium						280	280
	Poor							
	Total					135	280	415
90	Good				140	4,215	2,145	6,500
	Medium					2,405	120	2,525
	Poor							
	Total				140	6,620	2,265	9,025
Total all ages	Good	5,830	110	7,985	30,360	7,720	9,155	61,160
	Medium	24,575	3,310	5,315	59,770	15,170	12,760	120,900
	Poor	27,465	1,635	12,235	3,030	155	3,335	47,855
	Total	57,870	5,055	25,535	93,160	23,045	25,250	229,915

now occupy about 229 thousand acres. Those with Douglas-fir in the majority (types 9 and 10) cover about two-thirds of the immature conifer area; those predominately hemlock (types 15 and 16) or spruce (types 12 and 13) account for the remainder. By area, four-fifths of the immature stands started following fires, and one-fifth after logging.

Stands of pole size (6 inches d.b.h. or larger) are found on 141 thousand acres. Pole-size stands of Douglas-fir are most extensive in the Nestucca River drainage, where they vary from 20 to 50 years in age. Pole stands of spruce and hemlock are widely distributed in the coastal zone, with ages varying from 20 to 90 years. The 70- and 90-year classes which occupy several large tracts south of the Little Nestucca River are fast reaching merchantable size; small tracts have recently been cut for pulpwood. Tree density in the pole stands is relatively high, with 33 percent of their area well stocked, 61 percent of medium stocking, and 6 percent poorly stocked (table 3).

Seedling and sapling stands occupy about 88 thousand acres. The largest concentrations are found along the Salmonberry River in the northeast corner of the county and on old cut-overs adjacent to the Tillamook plains. Seedling and sapling stands are mostly of the 10- and 20-year age classes (table 3); their tree densities are far from satisfactory with only 16% of their area well stocked, 37 percent of medium stocking, and 47 percent poorly stocked.

Slightly over two-fifths of the immature conifer area is federally owned, largely within the Siuslaw National Forest; one-third is privately owned, and one-quarter is county owned.

Hardwoods

About 19 thousand acres is occupied by hardwood types. Red alder is the key species and bigleaf maple occasionally is found in mixture. In the northern part of the county, the hardwood stands are largely confined to the valley bottoms where they occur as long stringers following the streams. In the Nestucca River watershed they often cover the lower slopes as well, and form sizable tracts of almost pure alder. Heavy mixtures of alder also are found in many of the pole-size conifer stands, especially those of Douglas-fir.

Fifty-five percent of the hardwood area supports merchantable stands in which most of the trees are 12 inches in diameter or larger (type 31.5). Forty-five percent is comprised of smaller, nonmerchantable trees (type 31). Slightly less than half of the hardwood area is privately owned. The remainder is largely county owned or within the Siuslaw National Forest.

Deforested Areas

Altogether 226 thousand acres, that had been burned and cut over, was found to be nonrestocked when examined in the 1942 inventory.

Deforested burns (type 37) account for 214 thousand acres, and areas cut between 1920 and 1929 that have failed to restock (type 35a) aggregate about 12 thousand acres. Of the area logged prior to 1920, only 170 acres is still nonrestocked (type 35).

The largest concentration of these types is found in the north central portion of the county in an area that includes most of the Tillamook and Saddle Mountain burns. Lack of reproduction on this tremendous area is due both to the size and severity of the original fire and to the extent of reburns. Large areas are far removed from live trees and a source of seed, and conditions for natural restocking are, on the whole, not encouraging.

Several other large areas of deforested burn and nonrestocked cut-over are found in the Salmonberry drainage to the north of the Tillamook burn area and smaller areas of deforested burn are scattered in other parts of the county.

The 39 thousand acres of green timber cut over since 1930 was classed as "recent cut-overs" (type 36). Due to the relatively short period that has elapsed since cutting, these areas were not examined for restocking. They may or may not support seedling stands. Some 4 thousand acres of recent cut-over was covered by the 1939 fire, however, and will probably remain deforested for some time. The remainder of the type is mostly located adjacent to green timber and should restock within a reasonable period if adequately protected from fire.

Ownership of the deforested burns, nonrestocked cut-overs, and recent cut-overs is: 43 percent private, 46 percent county, 8 percent state, and 3 percent federal.

Noncommercial Forests

Almost pure stands of lodgepole pine (types 25 and 26) occupy small areas fronting the ocean. The trees in these stands do not attain commercial size and form and they cover only 1,800 acres. One additional area of 140 acres was found to be too rocky and steep to produce a stand of commercial size and was classed as a noncommercial rocky area (type 38).

Productive Capacity of Forest Land

During the survey, the forest lands of the coastal zone were rated according to their ability to grow spruce and hemlock, and the remainder, according to their ability to grow Douglas-fir. The results of the classification are given in table 4. Of the 449 thousand acres suited to Douglas-fir, 70 percent was found to be site class II or better, and of the 186 thousand acres adapted to spruce or hemlock, almost 90 percent is site class III or better. These figures rate Tillamook County's forest land considerably above the regional average in their ability to produce large yields of high-quality timber.

Table 4.--Land areas, forest land areas, and commercial conifer areas, by site quality class 1/
Data corrected to July 1, 1942

Kind of forest land and site quality class	Total area		Area in forest land	Area in commercial conifers
	Acres	Percent	Percent	Percent
Commercial conifer				
Douglas-fir				
Class I	3,575	.5	.5	.6
Class II	314,205	43.5	47.9	49.5
Class III	126,545	17.5	19.3	19.9
Class IV	4,470	.6	.7	.7
Total	448,795	62.1	68.4	70.7
Spruce-hemlock				
Class I	70,160	9.7	10.7	11.0
Class II	96,480	13.3	14.7	15.2
Class III	19,525	2.7	3.0	3.1
Total	186,165	25.7	28.4	29.3
Total commercial conifer	634,960	87.8	96.8	100.0
Lodgepole pine	1,800	.2	.2	
Noncommercial rocky	140	.1	.1	
Hardwood	19,360	2.6	2.9	
Total other	21,300	2.9	3.2	
All forest land	656,260	90.7	100.0	
Nonforest land	67,120	9.3		
Grand total	723,380	100.0		

1/ The "site quality" of a forest area is its relative productive capacity, determined by climatic, soil, topographic, and other factors. The index of site quality is the average height of the dominant stand at the age of 100 years. Five site quality classes are recognized for both Douglas-fir and spruce-hemlock types, Class I being the highest. In the survey, Douglas-fir classifications were used for Douglas-fir and western redcedar types; spruce-hemlock classifications were used for Sitka spruce, western hemlock, and fir-mountain hemlock types.

Saw-Timber Volume

The present saw-timber volume (table 5) amounts to about 6.4 billion board feet, representing about one-fifth of the estimated original volume. Old-growth Douglas-fir comprises 33 percent, second-growth Douglas-fir 9 percent, hemlock 34 percent, and spruce 17 percent. Noble fir, western redcedar, and red alder make up the bulk of the remainder. About half of the total volume is spruce and hemlock, the pulp species.

Two-thirds of the saw-timber volume is privately owned, the federal government owns one-fifth, largely on lands of the Siuslaw National Forest, and the remainder is divided among other public agencies. About 131 million board feet, located in state parks, municipal watersheds, and lighthouse and national forest reserves is not available for cutting.

In addition to the above volume, a considerable quantity of dead standing timber, killed in the 1933 or 1939 fires, is still salvable. It is expected that most of the fire-killed trees will have deteriorated too far to permit further large-scale salvage after 1945 or 1946. The quantity that will be reclaimed in the interim depends both upon the rate of deterioration and the trend of the log market.

Forest Utilization

Statistics on the annual sawlog production are not available for the years prior to 1925, but the area cut over from 1911 to 1924 indicates an average annual cut of about 120 million board feet for the period. Production increased gradually during the late 1920's, fell off sharply during the depression years, and returned to pre-depression levels in 1935. Since 1940, the cut has been stepped up greatly to help meet the lumber requirements of the war effort. The lowest annual cut, of 43 million board feet, was recorded for 1932; the highest, amounting to almost 404 million board feet, was reached in 1941. Average annual cut for the period 1925-41 amounted to 198 million board feet.

Old-growth Douglas-fir, in the form of sawlogs, has formed the major part of the forest crop. The volume removed in the form of posts, poles, piling, shingle bolts, pulpwood, and fuelwood has been relatively small. Since 1934, fire-killed timber, salvaged from the Tillamook burn, has made up a large portion of the annual production.

While Tillamook County ranks high in sawlog production, relatively few sawmills or other woodworking plants are located within its boundaries. Total installed capacity of its 6 sawmills amounts to only 150 thousand board feet per eight-hour shift. By volume, over 90 percent of the current sawlog production is shipped out of the county for milling and manufacture, the majority going to mills in the Portland area.

Forest Growth

In estimating the rate at which the county's forests are being replenished through growth, it was assumed that net growth in stands 150 to 300 years old is about offset by current losses in overmature stands.

Table 5.--Volume of timber by species and ownership class
Data corrected to July 1, 1942

Trees 16" and more d.b.h.[1]
Thousands of board feet, log scale, Scribner rule

Species	Private[2]	State		County	Federal				Total
		Available	Reserved[3]		Revested land grant	Public domain[4]	National forest		
							Available	Reserved	
Douglas-fir	1,126,266	14,365	11,920	157,342	12,418	10,284	76,642		1,409,237
Large old growth	568,399	3,318	10,563	52,631	13,885	2,399	43,466		694,661
Small old growth	109,527	13,391	2,380	24,068	47,939	28,271	115,756		340,332
Large second growth	61,606	1,805	4,031	19,857	46,547	24,762	66,732		225,340
Small second growth									
Sitka spruce	471,638	4,727	18,909	60,203		3,563	83,636	14,334	657,010
Large	170,618	13,708	1,587	22,344		2,344	185,936	1,218	396,755
Small									
Western hemlock	1,241,155	26,202	23,642	224,834	6,762	5,783	210,487	15,916	1,754,788
Large	186,852	10,506	1,080	34,459	1,756	9,636	178,036	12,416	434,741
Small									
Western redcedar	124,140	4,795	2,065	21,178	6,072	509	8,716		167,775
Live	498			158					656
Dead	2								2
Western white pine	960			180					1,140
Grand fir	171,997	420		15,271	185				187,873
Noble fir	2,315								2,315
Pacific silver fir	40,479	775	614	8,741	5,567	3,280	40,427	42	99,925
Red alder	2,209	74	74	541	321	145	509	13	3,886
Bigleaf maple									
Total	4,278,961	94,093	83,895	641,807	141,452	90,976	1,011,343	43,939	6,386,466

1/ Trees of hardwood species taken from 12" and more d.b.h.
2/ Includes 720,000 feet in Indian ownership.
3/ Includes 725,000 feet in municipal ownership.
4/ Includes 3,059,000 feet on lighthouse reserves.

Conifer stands less than 150 years old, which cover 287 thousand acres, are growing at a rate of about 91 million board feet, or 19½ million cubic feet per year (table 6). This represents only about 46 percent of the average volume cut during the past 17 years, and does not begin to compensate for the tremendous losses resulting from the Tillamook and other fires. About one-third of the current growth is being contributed by Douglas-fir stands and two thirds by stands of spruce and hemlock. As the stands now in the seedling and sapling stage reach pole size, a gradual increase in the current growth rate may be expected provided existing pole stands are not prematurely depleted.

Table 6.--Current annual conifer growth by forest types

Type	Current annual volume growth on	
	Trees 15.1 inches or more d.b.h.	Trees 5.1 inches or more d.b.h.
	M bd. ft.	M cu. ft.
Douglas-fir	30,398	8,575
Western hemlock	39,885	4,103
Sitka spruce	20,637	6,919
Total	90,920	19,597

The potential annual conifer growth of Tillamook County's forests, assuming that all commercial forest land would be producing at 75 percent of capacity, is estimated to be about 308 million board feet, or about 3-1/3 times the present increment.

Comparison of Inventories

Present trends in the forest situation in Tillamook County are indicated in the following tabulation which compares some of the findings of the 1942 reinventory with corresponding data collected in the original inventory of 1933.

	1933	1942	Change
Area of forest land	649 M acres	656 M acres	+ 1%
Saw-timber stands	199 M acres	140 M acres	- 29%
Immature conifer stands	89 M acres	229 M acres	+157%
Deforested burns and cut-overs	240 M acres	226 M acres	- 6%
Privately owned forest land	459 M acres	283 M acres	- 38%
Saw-timber volume	10,061 MM bd.ft.	6,386 MM bd.ft.	- 37%
Douglas-fir volume	5,089 MM bd.ft.	2,718 MM bd.ft.	- 47%
Western hemlock volume	2,973 MM bd.ft.	2,190 MM bd.ft.	- 26%
Sitka spruce volume	1,221 MM bd.ft.	1,056 MM bd.ft.	- 14%

The greatest change during the 8½ years between inventories has been in area of immature conifers. The large increase is due very largely to the retyping of immature mixed conifer and hardwood stands, particularly

in the southern part of the county; in the 1933 inventory these stands were typed as hardwood, in the 1942 inventory they were typed as conifer.

Other notable changes during the period were a rapid decline in area and volume of saw timber, especially Douglas-fir, a slight reduction in the area of deforested burns and old cut-overs, and a very pronounced shift in the ownership of the forest land from private to public. Extensive cut-over and burned areas have reverted to county ownership through tax foreclosure. The abandonment of a number of submarginal farms, largely in the Nestucca River watershed, has also brought about a small increase in the total area of forest land.

Forest Outlook

Fires of the past decade have completely changed the forest situation in Tillamook County. Prior to 1933, the large area of old-growth forests constituted a huge storehouse of raw material sufficient to supply large lumber and allied industries for a long period of years. Now the county's forest industry is faced with a number of very critical problems--a fast diminishing supply of old-growth timber, both green and fire-killed, a critical fire hazard in the Tillamook burn, and a large acreage of deforested land that is at present nonproductive. Solution of these problems is further complicated by the ownership pattern. However, opportunities for the development of a permanent forest industry of considerable extent are still present in the large area of accessible forest land, its high productive capacity, and its nearness to the wood-using and marketing centers of the lower Columbia River basin. These facts warrant careful consideration of means of restoring this large area of idle forest land to production. It would involve large-scale programs of hazard abatement and planting and an intensive system of fire protection.